

# UNPUBLISHED PRELIMINARY DATA

## BODY FLUID VOLUME AND ELECTROLYTE DERANGEMENTS IN FASTING

Semi Annual Report #1, April, 1965.

1. Period covered by report.

The grant was activated October 1, 1964. Equipment was delivered and suitable personnel were employed by December 1, 1964. This report, therefore, covers research undertaken in a 4 month period of effective work between December 1, 1964 and March 31, 1965.

GPO PRICE \$ \_\_\_\_\_

2. Personnel engaged in the research.

OTS PRICE(S) \$ \_\_\_\_\_

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Hard copy (HC) 1.00

3. Summary of research completed.

Microfiche (MF) .50

The experiments conducted to date comprise a series of electrolyte balance studies on rats maintained in metabolism cages. These were primarily to determine whether the rat, like man, continues to lose urinary sodium at the onset of a fast and whether this is exacerbated by fasting in the cold.

Figures 1 and 2 show the sodium "balance" (Na intake - Urine Na) of fasting rats kept at 26° and 3°C. They were fed a standard rat diet containing 20.26 mEq Na/100 g before and after the fast. The control animals, who were fed throughout, show a slightly increased positive sodium balance in the cold. The negative sodium balance in rats fasting at 3° was considerably greater and the subsequent retention of sodium upon refeeding was even more marked than in those fasting at 26°C.

Techniques are currently being refined in order to study plasma volume, extracellular fluid volume and total body water in animals subjected to the same regimens.

A particularly interesting aspect of these results is the substantial magnesium excretion in the cold, by both fed and fasted rats, and the sudden fall of urinary magnesium excretion upon return to the warm (Fig. 3). Since this extra excretion is seen in both fed and fasted rats and is cut off so promptly, it would appear that it might be a primary response to the cold and not merely a reflection of increased gluconeogenesis. Further experiments on the magnesium economy of the rat under these conditions are already in progress.

It would be expected that the sodium balance status of the rat prior to fasting or cold exposure would affect the subsequent sodium losses. Rats fed a sodium-deficient diet for 3 days prior to fasting and/or exposure to 3°C did not show a significant negative sodium balance (Fig. 4). The weight loss during fasting was

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loss in rats previously fed the sodium deficient diet than in those having received the normal diet; this is consistent with their maintenance of near sodium balance. The "sodium depleted" rats, however, showed an even more marked negative magnesium balance than those on a normal diet. The magnesium excretion was, nevertheless, terminated just as abruptly on return to 26°C (Fig. 5).

4. Summary of work in progress.

An elaborate series of 11 experiments is being conducted to investigate systematically the separate and additive effects of prior sodium status and prior ambient temperature exposure upon the sodium and magnesium losses during cold exposure and/or fasting.

Preliminary experiments will be undertaken to determine the effects of fasting on sodium balance in the guinea pig.

FIG. 1. Na BALANCE OF FASTED AND CONTROL RATS KEPT AT 26°C. AND FED  
PURINA DIET CONTAINING 20.26 mEq Na/100g FEED

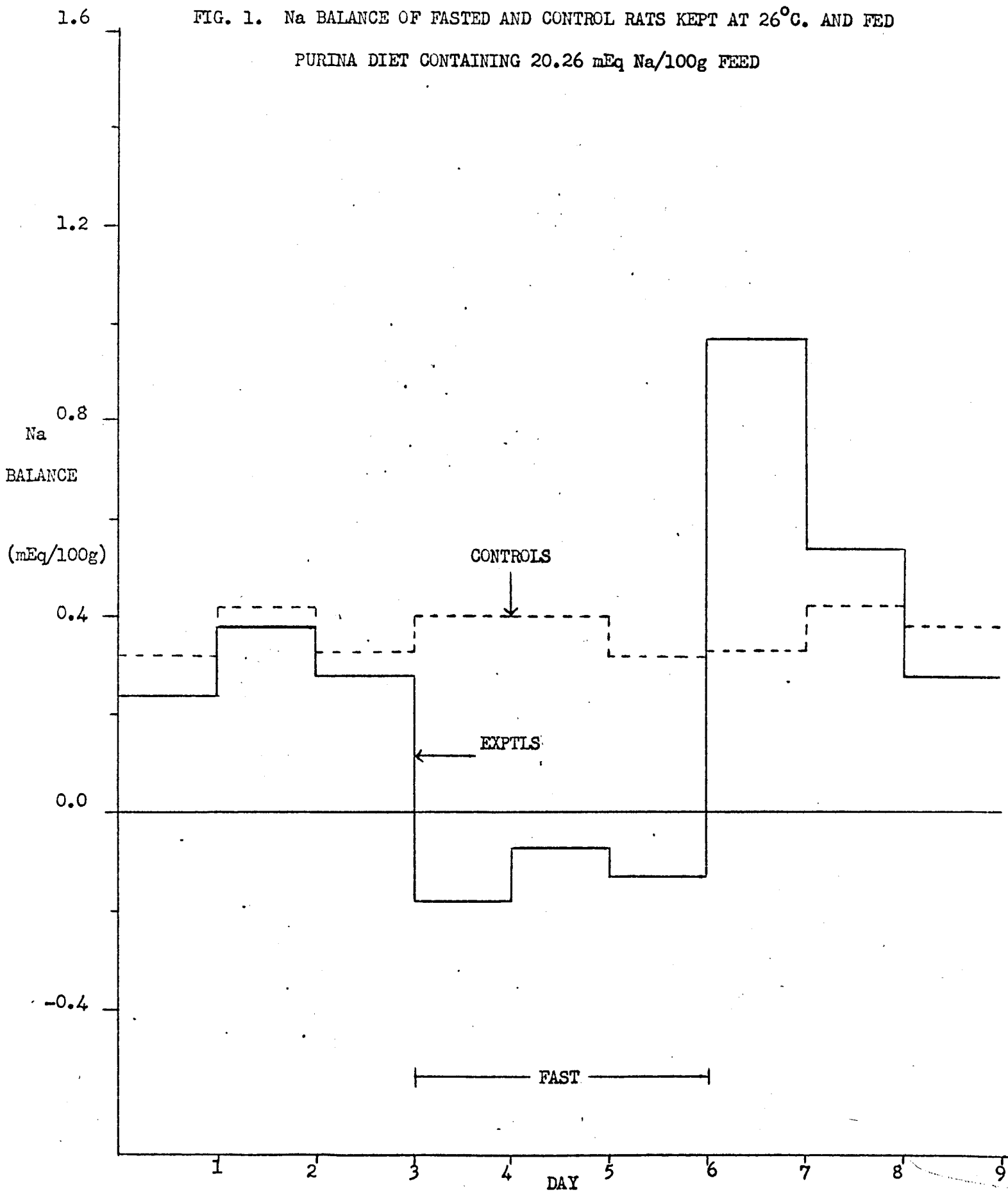


FIG. 2. Na BALANCE OF FASTED AND CONTROL RATS FED PURINA DIET

FAST AND RECOVERY AT 3°C.

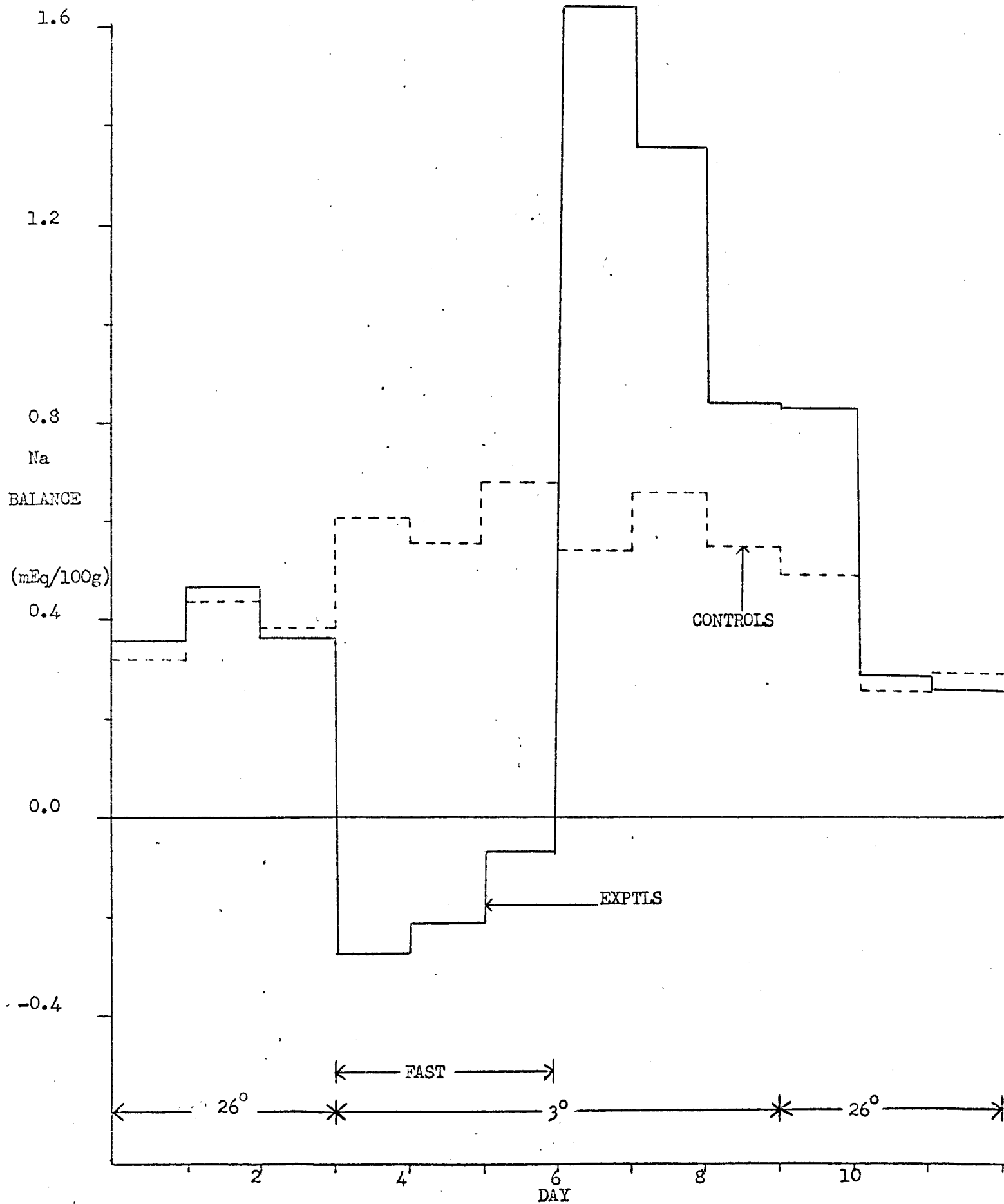


FIG. 3.  $\text{Mg}^{+2}$  EXCRETION OF FASTED AND CONTROL RATS FED PURINA DIET  
FAST AND RECOVERY AT  $3^{\circ}\text{C}$ .

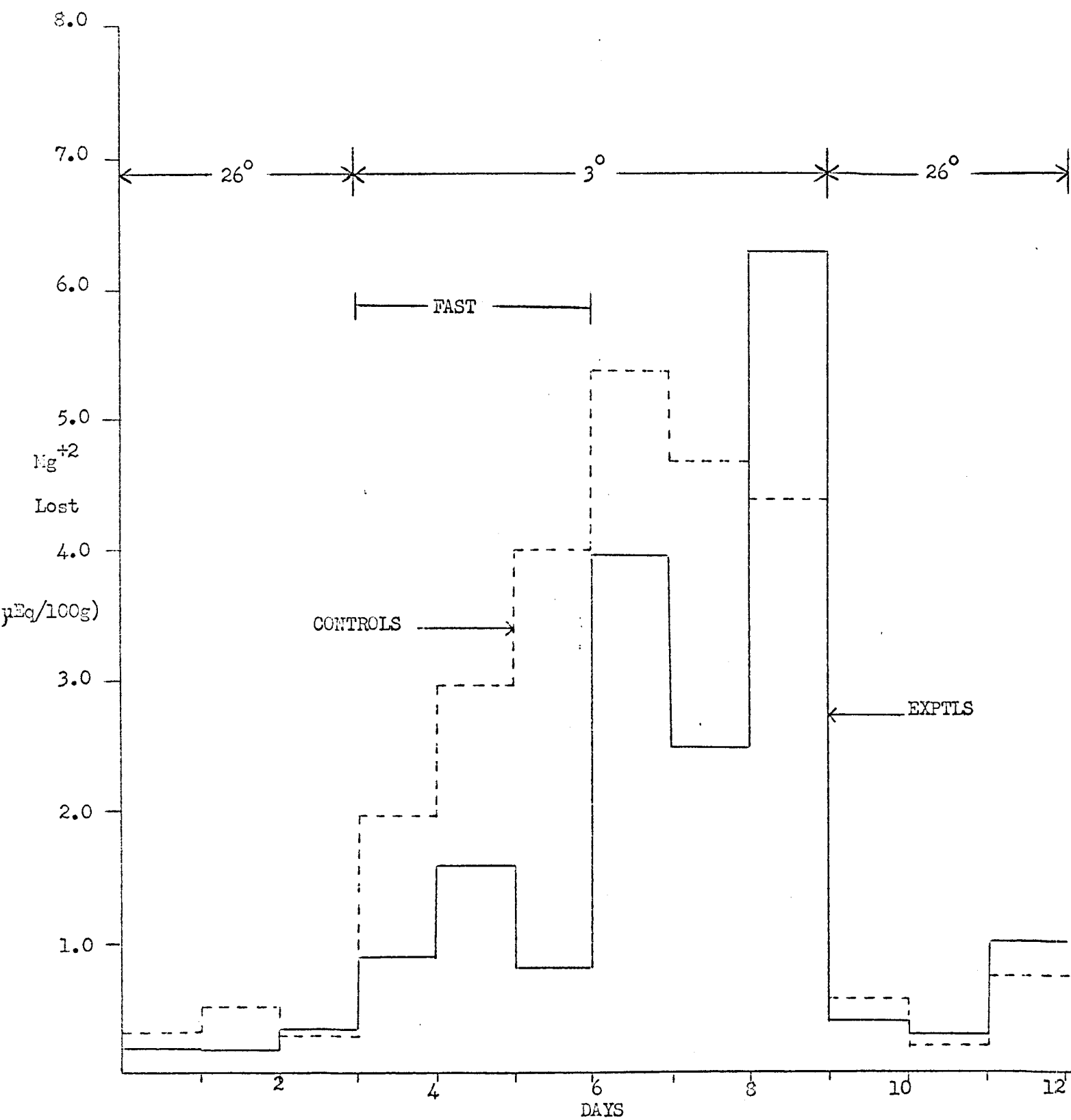


FIG. 4. Na BALANCE OF FASTED AND CONTROL RATS FED Na-DEFICIENT DIET  
FOR 9 DAYS AND PURINA THE LAST THREE DAYS  
FAST AND RECOVERY AT 3°C.

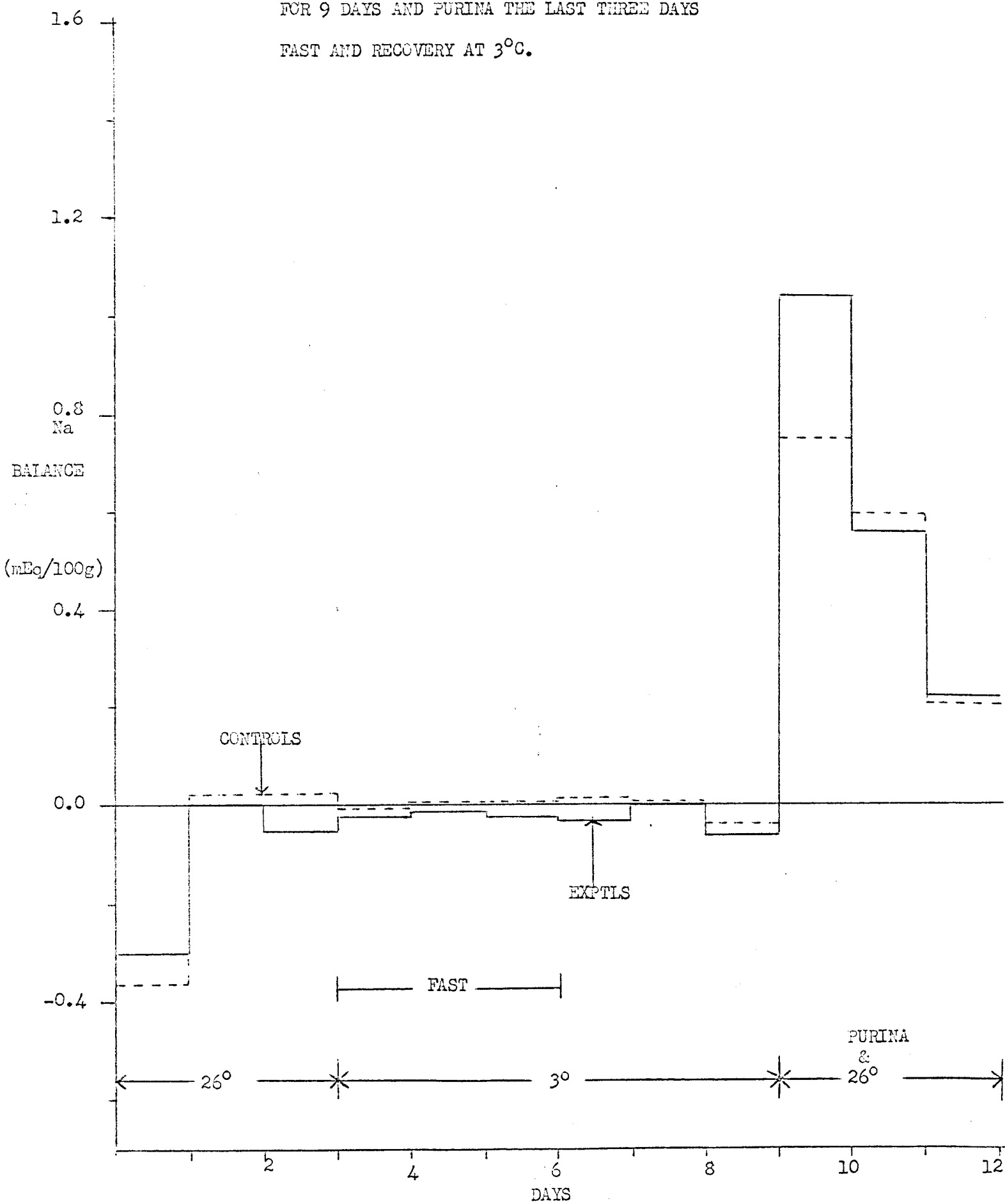


FIG. 5.  $Mg^{+2}$  EXCRETION OF FASTED AND CONTROL RATS FED Na-DEFICIENT  
DIET FOR FIRST 9 DAYS  
FAST AND RECOVERY AT 3°C.

